**Bacteriology Concepts**

**Always sterile: CSF, Synovial, Amniotic, Pleura, Pericardium, Peritoneum, Vitreous fluid**

**Usually: Blood, urine, lower respiratory, bladder, stomach, cervix**

**Never sterile: skin, mucosal membranes, upper respiratory tract**

Respiratory Normal Flora: Anaerobes: *Peptostrep., Actinomyces, Fuso.* Aerobes: *Strep., Haem., Neisseria*

Small Intestine: *Peptostrep., Porphyromonas, Prevotella*

Large Intestine: *Bifidobacterium, Eubacterium, Bacteroides, Enterococcus, Enterobacteriaceae (E.coli)*

Gent/urinary: *lactobacilli, Strep., Staph. (coag neg)* **(found in vagina and anterior urethra)**

Skin: *Strep., Staph (coag neg), Diptheroids (Corynebacterium)*

Blood: *Strep. (alpha), Staph (coag neg), Diptheroids, Micrococcus*

Urine: will most likely have skin/genital flora

Sputum: will most likely have upper respiratory tract flora

Phenotyping a bacteria

1. Visualization (gram stain, fluorescence, acid fast…)
2. Culture (enriched, selective, differential, special…)
3. Ezymatic activity (coagulase, catalase, ammonia, acid)
4. Antigens (capsular proteins, structural proteins, antibodies)

Genotyping a bacteria

1. DNA detection by PCR (target the 16S RNA ribosomal unit)
2. Automated methods

Bacillaceae- diverse group of bacteria (g(-/+), rod/coccus, aerobic/anaerobic) with the capability to form endospores. These are ubiquitous in the soil, grow rapidly under appropriate conditions, produce a wide variety of potent binary toxins to increase their own survival. An endospore is a dormant cell that forms from vegetative cells when environmental signals indicate some limiting reagent (such as lack of nutrients). The DNA is condensed, septum forms partitions with a complete chromosome and a couple ribosomes, dehydration, form a coat with layers of SASPs and DPA. The host cell disintegrates and the spores are released and remain viable indefinitely until the appropriate conditions arise and they germinate into a vegetative form.

The spore’s cortex is very much like peptidoglycan while its coat is a protein crosslinked network acting like a sieve to exclude toxic material. Has inner and out spore membrane and inner and outer coat layer. Only destroyed by high wet temps under pressure. Some boiling can kill if you heat then cool and repeat several times. They are resistant to most disinfectants and detergents.

Binary toxins two discrete proteins that engage the cell as an intact A-B structure. B oligomers are the product of preB proteolysis. These act as docking proteins that translocate A into the cytosol via acidified endosomes. Once inside, A can inhibit cell function through: mono-ribosylation of G-actin causing cytoskeletal disarray, proteolysis of MAP kinase which inhibits cell signaling, increasing cAMP resulting in edema/immune suppression